GOAL 1: Clean Air

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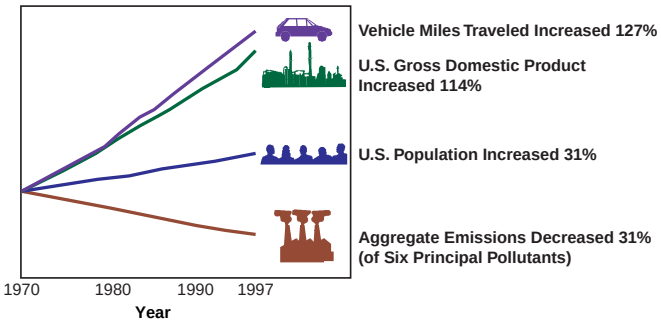
GOAL 1: CLEAN AIR

The air in every American community will be safe and healthy to breathe. In particular, children, the elderly, and people with respiratory ailments will be protected from health risks of breathing polluted air. Reducing air pollution will also protect the environment, resulting in many benefits, such as restoring life in damaged ecosystems and reducing health risks to those whose subsistence depends directly on those ecosystems.

OVERVIEW

EPA and its partners have made significant strides to protect public health by dramatically reducing pollution from factories, vehicles, power plants, and many other sources. Almost three decades of air pollution control have significantly improved air quality. These improvements occurred during times of population growth and while the number of vehicle miles traveled also were increasing.

Comparison of Growth Areas and Emissions Trends



Under the Clean Air Act, EPA has developed health-based National Ambient Air Quality Standards (NAAQS) for six common air pollutants: carbon monoxide (CO), lead (Pb), nitrogen dioxide (NO_2), ozone (O_3), particulate matter (PM), and sulfur dioxide (SO_2). Nationally, the 1997 average air quality levels were the best on record for all six pollutants, and the 1998 levels were as good or better for all pollutants except ozone.

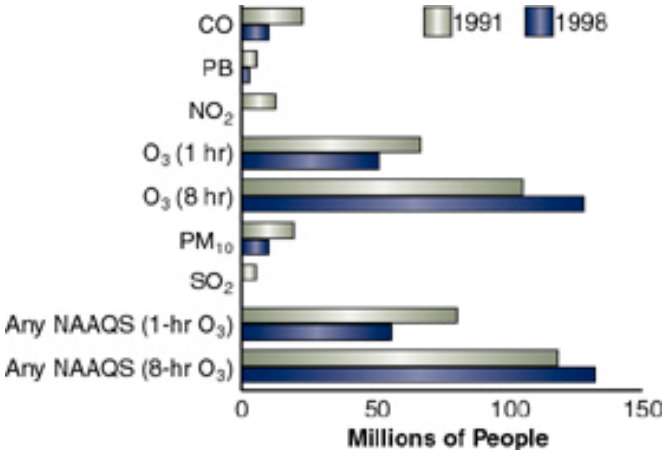
Many air quality improvements stem from pollution control efforts undertaken by State, local, and Tribal entities as well as industry actions. Efforts include reducing sulfur in fuels, tightening tailpipe standards for cars and diesel engines, and reducing emissions from power plants and other industrial plants.

Significant reductions of hazardous air pollutant emissions (e.g., benzene found in gasoline) also have been achieved. Hazardous air pollutants, known as "air toxics," are emitted from thousands of stationary and mobile sources and are transported through the atmosphere over regional, national, and global air sheds. EPA encourages the use of innovative approaches to reduce the release of air pollutants. For example, the Clean Air Act established a market-based program to control emissions from electric power plants that cause acid rain and other environmental and public health problems. These emissions can travel hundreds of miles away from the polluting sources, crossing State and national boundaries. The market-based program reduces sulfur and nitrogen emissions from electric utilities through the use of economic incentives. This gives utilities the flexibility and incentive to reduce emissions at a lower cost while still ensuring that overall emission reductions are achieved.

Despite this progress, air pollution problems remain. Though air quality trends have improved nationally, there are still both urban and rural areas with concentrations above the level of EPA's health-based national standards. Ozone, for example, remains a persistent problem. EPA and its State, Tribal, and local partners should continue to ensure steady improvements in air quality.

EPA established four objectives in its Strategic Plan to guide its work toward this goal: attain NAAQS for ozone and particulate matter; reduce

Population in Counties with Pollution Levels Above the NAAQS



emissions of air toxics; attain NAAQS for CO, SO_2, and lead; and reduce sulfur and nitrate deposition caused by acid rain.

FY 1999 PERFORMANCE

Attain NAAQS for Ozone and PM

By 2010, EPA is committed to improving air quality for Americans living in areas that do not meet the National Ambient Air Quality Standards (NAAQS) for ozone and particulate matter.

Ozone

More people live in counties with unhealthful levels of ground-level ozone than any other air pollutant. Ozone (urban smog) can impair lungs, cause chest pain and shortness of breath, and aggravate asthma, bronchitis, and emphysema. EPA's long-term objective for ozone is that by 2010, the air will be safer to breathe for 122 million Americans living in counties expected to have monitored air above the 8-hour standards in 1999.

In July 1997, EPA published revised, more protective NAAQS for ozone and PM. On May 14, 1999, the U.S. Court of Appeals for the District of Columbia Circuit issued an opinion restricting EPA's ability to implement the new regulations. The court found that a Clean Air Act standard, as interpreted by EPA in setting these standards, represented an unconstitutional delegation of legislative authority to the executive branch, but the court did not question the science or the process conducted by EPA in revising the NAAQS. While the Agency plans to take no actions that might be construed as inconsistent with the court's opinion, it continues to believe the new standards are necessary to protect public health. In late January, the Administration sought Supreme Court review of this decision.

The court decision did not affect the validity of the existing pre-1997 standards. To ensure that public health is protected, EPA has proposed to reinstate the 1-hour ozone standard in the nearly 3,000 counties where it had been revoked. Reinstatement of the 1-hour standard would ensure that air quality in areas that had met the 1-hour standard does not backslide while the litigation is being resolved.

EPA established performance goals for FY 1999 before the May court decision. ***Although the Agency exceeded its goal of revoking the 1-hour standard for eight areas with the non-attainment designation, judicial decisions have since caused the Agency to revisit the goal (APG 1).*** As a result of the court case, EPA is now working to reinstate the 1-hour standards.

Particulate Matter (PM)

PM is the general term for a mixture of solid particles and liquid droplets found in the air. These particles originate from many stationary and mobile sources. Studies have shown a link between PM exposures and potentially shortened life span as well as respiratory disease and other conditions. Sensitive groups that appear to be at greatest risk for the health effects include the elderly, children, and people with asthma. PM emissions also contribute to regional haze that impairs visibility in national parks and wilderness areas. An example of an ongoing project to improve visibility and reduce haze is shown in the sidebar on the following page.

EPA has been working with States and Tribes to develop and install monitoring networks to obtain data on fine particle emissions. ***As of the end of the fiscal year, the States deployed $PM_{2.5}$ ambient monitors at 1,110 sites, effectively meeting the purpose of the goal. The goal in the Annual Plan was 1,500 monitors; however, 1,110 monitors were deployed based on the results of a Congressionally mandated study done by the National Academy of Science (NAS) (APG 2).*** $PM_{2.5}$ "fine" are particles less than 2.5 micrometers in diameter. EPA also developed a strategy for deploying $PM_{2.5}$ monitors in

IMPROVING AIR QUALITY IN THE MT. ZIRKEL WILDERNESS AREA

Throughout the past decade, SO_2 emissions from coal-fired power plants in Colorado have affected visibility and contributed to high levels of acid precipitation in the Mt. Zirkel Wilderness Area. EPA, the U.S. Forest Service, the State of Colorado, the Sierra Club, and nearby utility companies are working to control emissions. This partnership has resulted in a negotiated settlement with the previously uncontrolled Hayden plant to build and operate new pollution control equipment. As a result, new controls will reduce annual sulfur dioxide emissions by 14,000 tons (nearly 85 percent) and oxides of nitrogen emissions by 5,000 tons (over 40 percent) by the end of 2000.

Indian country and in FY 1999 deployed 28 monitors on Tribal lands. The deployment of this monitoring network is a crucial first step toward healthier air for millions of people. The network will provide States and Tribes with new PM data so they can evaluate the acceptability of their air, identify emission sources, make non-attainment designations, and develop strategies and plans for attaining the new standard consistent with the ultimate outcome of the court case and any subsequent review of the standard. The May 14, 1999 court decision on the NAAQS did not affect the authority or need for establishment and operation of the $PM_{2.5}$ monitoring network. In addition, monitoring data will inform future reviews of the particulate matter air quality standard.

Research Contributions

Ground-level ozone is the most complex, difficult to control, and pervasive of the six air pollutants for which EPA sets NAAQS. Under certain conditions, emissions of ozone-precursors can travel hundreds of miles from their origin and result in high ozone concentrations over large regions. The Agency's research is providing and refining models for predicting the impact of downwind ozone concentrations. An important focus of the Agency's FY 1999 research was establishing the reliability of the Models-3/Community Multiscale Air Quality-Version 3 model for ozone NAAQS attainment planning through operational and diagnostic evaluation against field data. This model is the Agency's standard for projecting the requirements and benefits of alternative ozone control options and underlies Tribal, State, and local agency efforts to attain the ozone standard.

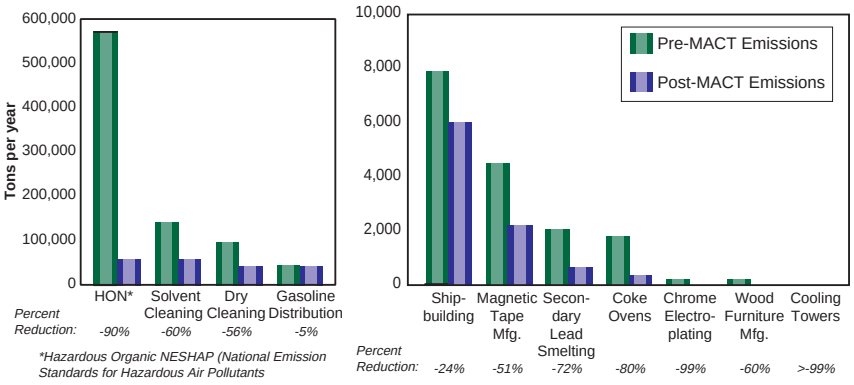
The Agency's particulate matter research program is closely aligned with high priority PM research issues recommended by the National Research Council. ***In FY 1999, EPA identified and evaluated two plausible biological mechanisms by which PM causes death and disease in humans (APG 3).*** The biological mechanisms identified and evaluated are the attributes (e.g., particle size and composition) of PM that underlie its toxicity and characteristics common to "PM susceptible" subpopulations (e.g., the elderly with cardiopulmonary disease). As part of its efforts in achieving this goal, EPA completed reports on PM-induced toxicity, PM dosimetry, and PM characteristics associated with biological responses. In addition to the numerous publications that have resulted from the research efforts thus far, EPA also sponsored a PM colloquium attended by 350 scientists from 12 countries. The meeting communicated the state of the science and identified the additional research needed to improve EPA's understanding of PM and increase its ability to reduce PM health risks.

Reducing Emissions of Air Toxics

By 2010, EPA is committed to reducing air toxics emissions by 75 percent from 1993 levels to significantly reduce the risk to Americans of cancer and other serious adverse health effects caused by airborne toxics.

Available data from U.S. cities indicate that air toxics may increase an individual's lifetime cancer risk by one in 10,000. People who live near certain major industrial plants may face even higher cancer risks. To address these sources, EPA develops and ensures implementation of technology-based standards for major stationary sources of toxic pollutants.

Reductions in Air Toxics Emissions from Implementation of MACT Standards



The Agency, in partnership with State, Tribal, and local agencies, is on track to meet its goal of reducing air toxic emissions. FY 1999 data indicate a 14 percent reduction in air toxic emissions, resulting in a cumulative reduction of 27 percent from 1993 levels (APG 4). EPA calculates the percentage reductions annually using the National Toxics Inventory (NTI), which is updated every three years. The 1999 NTI will be published in 2002. EPA's Regional offices reviewed emission inventories from 18 States and State air quality data from 100 monitoring sites to assure quality and consistency. Concurrently, States conducted 25 emission inventories and collected ambient data from 157 monitoring sites. To date, EPA has developed and issued 46 technology-based standards to protect human health and the environment by cutting large quantities of toxic emissions released into the air.

The technology-based regulation of air toxics already has brought significant reductions (see graphs above). From 1992 to 1997, EPA promulgated Maximum Achievable Control Technology (MACT) standards for 92 source categories, eliminating one million tons of air toxics and 1.5 million tons of smog-causing Volatile Organic Compounds (VOCs) per year. In the preceding 20 years, only seven such standards, eliminating 125,000 tons of toxics, were in place. In FY 1999, EPA promulgated 16 MACT standards for 26 source categories.

Air pollution from mobile sources, such as cars and trucks, accounts for close to one-third of the nationwide emissions of air toxics. EPA is working to reduce toxic air emissions from mobile sources. Since 1995, EPA has been working with States to implement a two-phase reformulated gasoline (RFG) program to improve air quality. Phase I of the RFG program made great progress. Between 1995 and 1999, it cut emissions of toxic pollutants 17 percent, compared to conventional gasoline, in communities where 75 million people live and work. Phase II, which began January 1, 2000, takes another step toward cleaner air. It will reduce smog-forming pollutants 27 percent more than conventional gasoline.

Research Contributions

Air toxics research provides the knowledge necessary to quantify emissions, identify key pollutants, and develop strategies for cost-effective risk management. ***In FY 1999, the research program completed health assessments for four high-priority air toxics, one short of the five assessments that were planned (APG 5).*** Dose-response assessments for dichloropropene and cadmium will allow the urban air toxics program to evaluate potential risks from these chemicals. Assessments for ethylene glycol monobutyl ether and acetonitrile will assist in estimating residual risk and in determining whether to rescind a chemical's toxic designation. The fifth assessment, for vinyl chloride, was delayed and will be completed in FY 2000. This delay will not impact achievement of the 2010 strategic objective.

Attain NAAQS for CO, SO_2, and Lead

By 2005, EPA is committed to improve air quality for Americans living in areas that do not meet NAAQS for CO, SO_2, and lead. (All areas currently meet the standard for nitrogen oxide–NO_X.)

These pollutants pose high risks to both public health and the environment. They can affect breathing, cause respiratory illness, and aggravate existing cardiovascular disease. Exposure to lead can cause kidney disease and reproductive and neurological disorders. EPA has successfully reduced these air pollutant emissions while working toward the goal of having all areas in attainment by 2005. EPA will continue to work with areas to develop emission reduction strategies to clean the air of these pollut-

ants and to prevent areas with clean air from deteriorating.

Areas are redesignated when they are determined to meet EPA's standard for clean air. ***In FY 1999, 13 additional areas were redesignated as attainment areas, having met the EPA standard for CO, SO_2, or lead, thus reducing the total from 158 to 74 non-attainment areas (APG 6).*** While working with areas to maintain clean air, EPA will continue to bring non-attainment areas into attainment through mobile source program implementation, including wintertime oxygenated fuels programs and inspection and maintenance programs for automobiles.

EPA estimates that mobile sources emit 77 percent of the national CO emissions and a larger share in urban areas. While only a handful of non-attainment areas remain, EPA and the States will rely on continued or strengthened reductions from mobile sources to complete the task of attaining the ambient standard by 2005 and to offset expected longer-term population and economic growth.

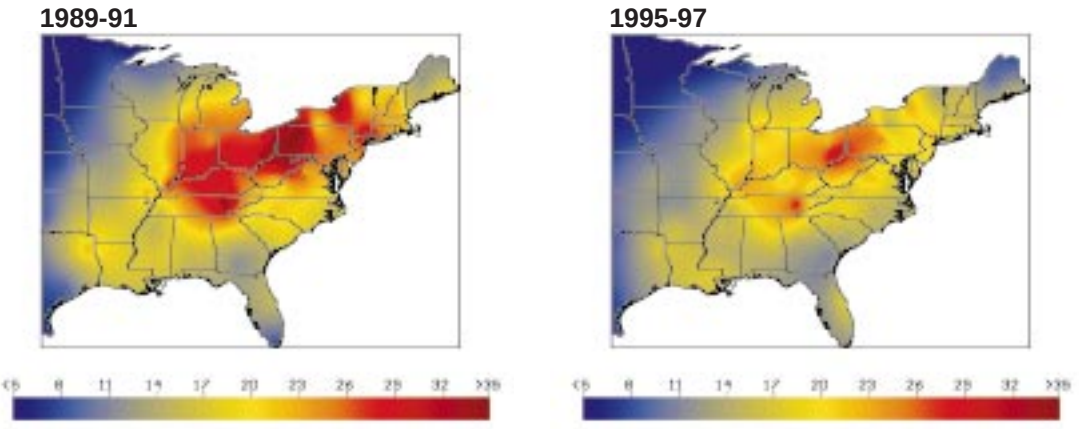
Reduce Sulfur and Nitrate Deposition That Causes Acid Rain

By 2010, EPA's objective is that ambient sulfates and total sulfur deposition will be reduced by 20-40 percent from 1980 levels due to reduced sulfur dioxide emissions from utilities and industrial sources. By 2000, ambient nitrates and total nitrogen deposition will be reduced by 5-10 percent from 1980 levels due to reduced emissions of nitrogen oxides from utilities and mobile sources.

Emissions of SO_2 and NO_X react in the atmosphere and fall to earth as acid rain, causing acidification of lakes and streams and contributing to tree damage at high elevations. NO_X emissions are also a major precursor of ozone. SO_2 and NO_X gases form fine particles that ultimately affect public health by contributing to premature mortality, chronic bronchitis, and other respiratory problems. The fine particles also contribute to reduced visibility in national parks and elsewhere. Additionally, NO_X deposition contributes to the depletion of oxygen in coastal waters, damaging native aquatic life. The maps below represent wet sulfate deposition over time. As illustrated in the 1995-1997 map, following the 1995 implementation of the Acid Rain Program, total sulfur deposition fell in a dramatic and unprecedented reduction of up to 25 percent over a large area of the eastern United States.

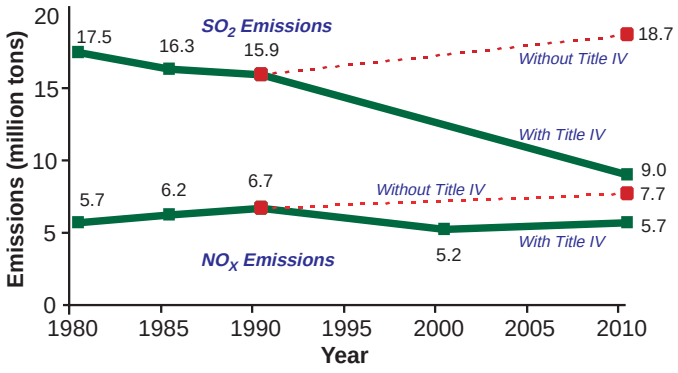
Emissions data are not available until 12 months after the end of the calendar year. Therefore, 1999 data will not be available until late 2000. SO_2 emissions from utility sources were 13.1 million tons in 1997 compared to 17.5 million tons in 1980, representing a decrease of 4.4 million tons. NO_X emissions from coal-fired utility sources were 5.6 million tons in 1997 compared to 6.1 million tons that would have been emitted in the absence of the Clean Air Act Amendments of 1990. ***EPA is on track to meet its goal to maintain four million tons of SO_2 emissions reductions from utility sources and maintain 300,000 tons of NO_X reductions from coal-fired utility sources (APG 7).***

Changes in Sulfate Deposition in the Eastern U.S. Pre- and Post-1990 CAA Amendments



The graph below illustrates the long-term goal of emissions reductions under the Title IV trading program of the Clean Air Act. During Phase I of the program, SO_2 emissions initially dropped by nearly 25 percent below the mandated emission ceiling because affected utility sources reduced emissions to save allowances for use under the more stringent Phase II of the program, which begins in 2000 and has stricter reduction rules. These banked allowances will be gradually used up until the mandated emission ceiling is reached in 2010.

Reductions in SO_2 and NO_X Emissions from Utility Sources Following CAA Title IV Implementation



NO_X emissions are projected to be 5.7 million tons in 2010, or two million tons below levels that would have been attained without implementation of Title IV. Unlike the SO_2 program, NO_X emissions are not capped; rather, affected sources are required to adhere to an emissions rate. Without a cap, NO_X emissions would be expected to rise in the future as demand for electrical use increases.

The emissions trading program has proven to be an extremely cost-effective mechanism, facilitating 100 percent compliance by affected sources and stimulating early emissions reductions. In the Northeast and Mid-Atlantic Regions of the United States, where ecosystems are most sensitive to acidic deposition, sulfate levels in precipitation have declined by up to 25 percent. Initial findings on nitrate concentrations, however, showed little decrease because overall NO_X emissions have remained fairly constant due to offsetting increases in emissions from non-utility sources.

PROGRAM EVALUATION

Reformulated Gasoline (RFG) Evaluation

In December 1998, in response to growing concern about MTBE (Methyl Tertiary Butyl Ether) in drinking water, EPA's Administrator appointed a panel to examine benefits and concerns related to RFG (MTBE and other oxygenates). The examination also included identifying data gaps and evaluating alternatives to the status quo based on their effects on air quality, water quality, and stability of fuel supply and cost. The report can be found at http://www.epa.gov/oms/consumer/fuels/mtbe/mtbe.htm. Based on its evaluation of the RFG program, the panel found the following:

- RFG has provided substantial reductions in the emissions of a number of air pollutants from motor vehicles, in most cases resulting in emissions exceeding those required by law.
- Detectable amounts of MTBE occur in approximately five to ten percent of drinking water supplies in RFG areas. To date the great majority of these detections have been below levels of public health concern but at levels that have raised consumer taste and odor concerns.
- The major source of groundwater contamination appears to be releases from underground gasoline storage systems. Other sources of water contamination include small and large gasoline spills to ground and surface waters and the release of unburned fuel from recreational water craft, particularly those with older motors.

To address these issues, the panel recommended the following actions:

- Improve the nation's water protection programs, by implementing over 20 specific actions to enhance Underground Storage Tank, Safe Drinking Water, and private well protection programs.
- Reduce the use of MTBE substantially and request that Congress provide clear Federal and State authority to regulate and/or eliminate the use of MTBE and other gasoline additives that threaten drinking water supplies.

- Ensure that there is no loss of current air quality benefits.

Emissions Trading and Other Market-Based Regulatory Tools

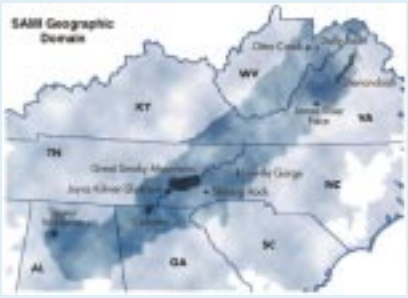
A comprehensive evaluation, "New Tools for Improving Government Regulation: An Assessment of Emissions Trading and Other Market-Based Regulatory Tools," indicates that pollution trading can reduce the compliance costs of regulated industries, provide more flexibility to meet emission goals, help generate public support for new regulatory programs, and serve as the basis for fashioning compromises acceptable to a wide range of interests. The evaluation further indicated that trading is not suitable for use in every regulatory program, with the challenge being to determine when it should be used and how to design and implement trading in ways that ensure environmental protection and economic efficiency goals are achieved. The evaluation also identified those aspects of the acid rain program that contributed to its success. The report, issued in October 1999, is available at http://www.endowment.pwcglobal.com/pdfs/BrynerReport.pdf.

Particulate Matter (PM) Monitors

The General Accounting Office (GAO) report, "EPA's Actions to Resolve Concerns With the Fine Particulate Monitoring Program," was released on August 27 1999, and is available at the GAO website: http://www.gao.gov/daybook/990827.htm. The report focuses on two main areas of the PM monitoring program: EPA's response to a report by the National Academy of Sciences from March 31, 1998 and issues encountered by State and local agencies in implementing the program. GAO's conclusions emphasize the need for more complete field testing of the speciation samplers prior to deployment. The speciation samplers would help provide a picture of which sources are contributing which components to ambient air and would help identify the sources of secondarily formed particles. The information will be crucial for States to be able to develop control strategies that target the least-costly control measures.

SOUTHERN APPALACHIAN MOUNTAINS INITIATIVE

In the southeastern States, the economy is thriving, and the population is growing. There is an increased demand for transportation, energy, and manufactured products. Emissions from industries, power plants, and vehicles contribute to the decline in air quality in the Southern Appalachians. Because air pollutants travel across State boundaries, effective air quality management requires a regional approach. The voluntary effort called the Southern Appalachian Mountains Initiative (SAMI) identifies and recommends emissions management strategies to remedy existing and prevent future adverse air quality effects in Southern Appalachia.



SAMI participants are: Alabama, Georgia, Kentucky, North Carolina, South Carolina, Tennessee, Virginia, West Virginia, EPA, National Park Service, U.S. Forest Service, industries, environmental organizations, academics, and interested members of the public.

SAMI is conducting an integrated assessment to link emissions, atmospheric transport, exposures, and effects of ozone, acid deposition, and fine particles. SAMI's air quality and other computer models track air emissions from their sources across the eastern United States, simulate the complex chemical and physical processes that occur in the atmosphere, project air pollutant exposures across the SAMI region, and estimate the environmental and socioeconomic impacts of these air pollutant exposures. The assessment is considering the impacts of current air regulatory requirements and alternative emissions management strategies for the years 2010 and 2040. Results will be summarized in a final report that will be used to develop SAMI's recommendations about emissions management strategies for consideration by policy makers.

CONCLUSIONS AND CHALLENGES

EPA and its partners have achieved many of the most cost-effective pollution reductions and now plan to address the last, most difficult increment in emission reductions in order to achieve the nation's clean air goals. EPA's strategy, consistent with Agency-wide reinvention efforts, is to set aggressive goals and use flexible strategies while emphasizing accountability. Within this overall framework, the Agency would like to achieve the following:

- EPA's challenge is to minimize the burden on the regulated community while maximizing pollution reduction across all titles of the Clean Air Act. For example, many air toxics benefits achieved through VOC reductions are associated with ozone reduction efforts. The sidebar on the previous page illustrates a model program that successfully combines multi-pollutant, multi-State emissions management strategies to remedy existing and prevent future adverse air quality effects in Southern Appalachia.
- The Agency needs to ensure that research addresses those areas most likely to pose risks to public health and the environment. For example, EPA has developed a multi-pollutant air research program to explore the combined influence of criteria air pollutants and air toxics.
- The Agency will continue working with Tribal governments to develop their capacity for implementing the Clean Air Act.

In summary, EPA has made significant progress toward achieving its long-term goal of cleaner air for all Americans. During FY 1999, EPA proposed the next generation of cleaner burning engines and cleaner burning fuels, which will strengthen tailpipe standards for cars and other vehicles and also will reduce sulfur in gasoline. Significant reductions in air toxics emissions were achieved through the implementation of technology-based standards. States and Tribes completed a massive effort to build a nationwide monitoring network for characterizing PM. In addition, substantial reductions in SO_2 and NO_x from utility sources are lowering acid rain levels in the Northeast and Mid-Atlantic Regions.

It is important, however, not to lose sight of air pollution problems that still remain. For example, although the country has made substantial progress toward reducing concentrations of ozone and PM, many areas continue to experience unhealthy levels of those as well as other pollutants. EPA will continue working with its partners to ensure that every American has clean air.

KEY MILESTONES FOR THE FUTURE

- EPA needs to coordinate the technical and scheduling requirements for the regional haze and $PM_{2.5}$ programs to address environmental problems that are the products of the same pollutants and precursors. Because many of the controls needed to achieve the NAAQS for $PM_{2.5}$ also may be needed to meet reasonable progress targets for regional haze, the Agency called for the development of strategies on a schedule that would maximize States' opportunities to establish a single set of requirements to address both programs.
- The development of credible inventories, models, and monitoring data are critical as EPA begins to address residual risk assessments and implement the urban toxic strategy.
- EPA needs to employ innovative partnerships to address risk from all air pollutants.